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ABSTRACT

As educators continue to debate the value of phonic versus meaning-based approaches to reading, a significant number of children continue to fail to learn to read. One of the fundamental tasks facing the beginning reader is to develop the realization that speech can be segmented and that these segmented units can be represented by printed forms. A review of some of the large-scale phoneme awareness training studies reveals an array of activities that can be used by the classroom teacher or clinician. Three studies by the author investigated these issues. The first study, involving 90 kindergarten children in inner-city schools, concluded that it is the combination of phoneme awareness training and learning to connect the sound segments to letters that makes a difference. In the second and third studies, for low-income children from inner-city schools who had limited knowledge about the alphabet prior to their kindergarten participation in the study, an early emphasis on phonological awareness, followed by a code-emphasis approach to reading in first grade, resulted in significant reading achievement gains. An early emphasis on phonological awareness puts children in a better position to take advantage of reading and spelling instruction. Contains 62 references. (SR)

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Learning How Print Maps to Speech

by Benita A. Blachman

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GETTING READY TO READ

Learning How Print Maps to Speech

Benita A. Blachman

"The Reading Wars" was the title of a recent article in a special edition of *Newsweek* magazine (Kantrowitz 1990). Regrettably, it is an apt title to describe the dissension in the reading community over how reading is to be taught to young children. If we agree that "the ability to read well is basic to our national survival" (Chall 1989, p. 521), then perhaps the passion that fuels the reading controversy will be easier to understand. Unfortunately, the losers in this "reading war" are too often the children who are not getting the best that we have to offer. As educators and researchers debate the value of phonic versus meaning-based approaches to reading (the most popular, at the moment, being whole language) or, as they are more generically referred to, skills-based approaches versus literature-based approaches, a significant number of children continue to fail to learn to read. Even as adults, it is estimated that 20% of the population continue to have severe problems with the most common reading activities (Stedman and Kaestle 1987).

AN EMPHASIS ON LANGUAGE

Instead of focusing on theoretical divisions in the field, it might be more constructive to ask if there is anything related to reading about

which we all agree. It is safe to say that there is now a consensus that reading is a language-based activity. Although today we tend to take this simple observation for granted, in the '60s and well into the '70s a different point of view prevailed. The alternative viewpoint was perhaps best summarized by George Spache (1961), a noted authority in the reading field, who wrote: "It seems fairly obvious that reading, like most school work, is primarily a visual act" (p. 3). As a consequence of the emphasis on vision, the focus at that time in explaining reading problems was on identifying and remediating deficits in visual perception. Eventually the visual perceptual deficit explanation of reading difficulties was questioned, and numerous researchers presented evidence that directly contradicted it (Benton 1975; Larsen and Hammill 1975; Vellutino 1977, 1979). In the last two decades, we have seen a renewed interest in a language-based view of reading and its disabilities (Kamhi and Catts 1989; Kavanagh and Mattingly 1972; Liberman 1971, 1983; Shankweiler and Liberman 1989; Vellutino 1979, 1987). In the context of that perspective, we have made great strides in our understanding of literacy acquisition.

As a consequence of the emphasis on language that pervades the reading community, a number of promising practices are appearing in preschool, kindergarten, and first grade classrooms that emphasize the creation of a rich environment of oral and written language (Anderson et al. 1985; Durkin 1989). In *Becoming A Nation of Readers: The Report of the Commission on Reading* (Anderson et al. 1985), written under the auspices of the National Academy of Education and sponsored by the National Institute of Education, the Commission reports that:

> Reading must be seen as part of a child's general language development and not as a discrete skill isolated from listening, speaking, and writing. Reading instruction builds especially on oral language. If this foundation is weak, progress in reading will be slow and uncertain (p. 30).

The Commission, charged with the task of synthesizing the best research in reading and translating that research into guidelines for practice, proceeded to describe the elements needed to foster the emerging literacy of the preschool and kindergarten child. The essential elements included, for example, extended conversations at home with parents and experiences with written language. Specific emphasis was placed on conversations that require reflection and that will help children "exercise their memories . . . and . . . learn to give complete descriptions and tell complete stories" (p. 23). At the same time, it was suggested that experiences with written language, especially reading aloud to children, should be a priority. To stress its importance, reading aloud to children was described as "the single most im-

portant activity for building the knowledge required for eventual success in reading" (p. 23).

The Commission advised continued opportunities in kindergarten to stimulate oral language development and listening comprehension through thoughtful discussions—for example, discussions about the storybooks that have been read to the children. The Commission also pointed out that this emphasis on oral language development, although necessary, is not sufficient to guarantee success in reading. Children need to acquire knowledge about written language related to both form (e.g., we hold the book right side up and turn the pages from front to back) and function (e.g., it can entertain, instruct, or direct). They also need to acquire knowledge of letter names and knowledge about the relationships betweens letters and sounds. Learning to write (whether it is with paper and pencil, with plastic letters, or in front of a computer screen) and encouraging writing, for example, through accepting and encouraging invented spellings (e.g., such as *t* for tame, followed by *tm*, *tam*, and eventually *tame*), is a way to facilitate the acquisition of letter-sound correspondences. It is also a way to encourage a child to use his or her knowledge of written language to communicate with others (Anderson et al. 1985, p. 34).

Although I have taken some liberties in my summary of the Commission's recommendations for preschool and kindergarten children (most notably in deleting some ideas and emphasizing others), it is hard to see how educators from either the phonics/skills-based orientation or the meaning literature-based orientation to beginning reading could disagree with the recommendations made by this panel. Indeed, if these recommendations were actually in place in all of our preschool and kindergarten classrooms (along with recommendations for later years, such as the suggestion that children should spend more time in independent reading and writing and less time on workbooks), we would be much further along toward our goal of "becoming a nation of readers."

DIFFERENCES IN PRESCHOOL LITERACY EXPERIENCES

It is important to remember, of course, that children come to school with differing levels of awareness about the conventions of written language and about the connections between oral and written language. A vivid description of these differences and their influence on literacy acquisition is described by Adams (1990) in her book *Beginning to Read: Thinking and Learning about Print*. For example, Adams describes her

own child's experiences with print, especially having been read to on a regular basis, and calculates that somewhere between 1,000 and 1,700 hours will have been spent reading to John "one-on-one, with his face in the books" (p. 85) before he enters first grade. Others also have found that this frequency of reading to children is commonplace in culturally mainstream homes (Heath 1983). In addition, Adams also estimates that her son spent 1,000 hours watching "Sesame Street," and another 1,000 hours in written language activities, such as playing with magnetic letters on the refrigerator, playing word games in the car and on the computer, and participating in oral and written language activities at preschool. As Adams so aptly puts it, "Any way we work it, it seems a safe bet that John and the majority of his culturally mainstream peers will have experienced thousands of hours' worth of prereading activities before entering first grade" (p. 86).

In striking contrast, according to Adams (see also, Feitelson and Goldstein 1986, Heath 1983, Teale 1986, cited in Adams 1990), are the children who have never, or only rarely, been read to, who are living in homes without books, without models of adults who value reading and who read for their own pleasure, without magnetic letters, paper, pencils, crayons, and certainly without a home computer with letter and word games. In addition, there are the children who, despite exposure to a rich oral and written language environment as preschoolers, fail to make the necessary connections between print and speech that facilitate literacy acquisition.

Ideally, these differences in preschool literacy experiences and in learning needs will be taken into account by knowledgeable kindergarten and first grade teachers, who will modify their instruction to accommodate a wide range of individual differences. But, as we know, this ideal is not always reached. If nothing else, these vast differences in preschool experience and in the ability to take advantange of appropriate literacy experiences when they are available, suggest that any single approach, regardless of its orientation, will not meet the needs of all children. For children who haven't learned to recognize the words on the page, an approach that relies only on continued exposure to literature (however "good" the literature) will leave them without the direct instruction they need to make the connections between print and speech. On the other hand, a model that relies too heavily on direct instruction in isolated skills (skills that many children will already have acquired) will leave children without the enrichment and opportunites for rewarding literacy experiences that all children need and deserve.

LEARNING HOW PRINT MAPS TO SPEECH

If, as I suspect, most would accept the recommendations selected from *Becoming A Nation of Readers*, then where, you may wonder, does the great controversy over the teaching of beginning reading lie? One important point of disagreement concerns the way in which children come to understand how print maps to speech. Specifically, we now know that one of the fundamental tasks facing the beginning reader is to develop the realization that speech can be segmented and that these segmented units can be represented by printed forms (Liberman 1971). Although it is obvious to literate adults that the letters of the alphabet more or less represent phonological segments of speech, this awareness cannot be taken for granted in the young child. To appreciate the complexity of the task facing the beginning reader, one must first appreciate the complex relationship among the phonemes in the speech stream. Speech, unlike writing, "does not consist of separate phonemes" produced one after the other "in a row over time" (Gleitman and Rozin 1973, p. 460). Instead, as Liberman and Shankweiler (1991) explain, "in producing the syllable 'ba,' for example, the speaker assigned the consonant we know as 'B' to the lips, and the vowel we know as 'A' to a shaping of the tongue, and then produced the two elements at pretty much the same time" (p. 5). This merging or coarticulation of the phonological segments during speech production (the folding of the consonants into the vowels) (Liberman et al. 1967; Liberman 1971) has advantages for speech but, as we shall see, obscures the segmental nature of the speech stream and makes it difficult for the young child to access the phonological units that are represented by an alphabet. Liberman and Shankweiler (1991) help us understand this phenomenon:

> The advantageous result of such coarticulation of speech sounds is that speech can proceed at a satisfactory pace—at a pace indeed at which it can be understood (Liberman, Cooper, Shankweiler, and Studdert-Kennedy 1967). Can you imagine trying to understand speech if it were spelled out to you letter by painful letter? So coarticulation is certainly advantageous for the perception of speech. But a further result of coarticulation, and a much less advantageous one for the would-be reader, is that there is, inevitably, no neat correspondence between the underlying phonological structure and the sound that comes to the ears. Thus, though the word "bag," for example, has three phonological units, and correspondingly, three letters in print, it has only one pulse of sound: The three elements of the underlying phonological structure—the three phonemes—have been thoroughly overlapped and merged into that one sound—"bag."

> [Beginning readers] can understand, and properly take advantage of, the fact that the printed word *bag* has three letters, only if they are aware that the spoken word *"bag,"* with which they are already quite familiar, is divisible into three segments. They will probably not know that spontaneously, because, as we have said, there is only one segment of sound, not three, and because the processes of speech perception that recover the phonological structure are automatic and quite unconscious (pp. 5–6).

As we now know from extensive research conducted during the last fifteen years, developing an awareness of the phonological segments in words is an important prerequisite to understanding how an alphabetic transcription represents speech. "That transcription will make sense to beginning readers only if they understand that the transcription has the same number and sequence of units as the spoken word" (Liberman and Shankweiler 1991, p. 6). An important insight in early reading acquisition is the recognition that, for some children, difficulty in learning to decode occurs precisely because they lack an awareness of the segmental nature of speech and, thus, never fully understand how an alphabet works (Freebody and Byrne 1988; Juel 1988; Stanovich 1986; Williams 1987). The research clearly indicates that children who can demonstrate their phonological awareness by, for example, categorizing words according to common initial, middle, or final sounds, or by counting, deleting, or reversing phonemes, are more likely to be among our better readers. Children who lack this awareness are likely to be among our poorest readers (Blachman 1984; Blachman and James 1986; Bradley and Bryant 1983; Juel 1988; Juel, Griffith, and Gough 1986; Lundberg, Olofsson, and Wall 1980; Mann 1984; Mann and Liberman 1984; Share et al. 1984; Stanovich, Cunningham, and Cramer 1984; Torneus 1984; Vellutino and Scanlon 1987).

In addition to the evidence that phonological awareness is a highly significant and consistent predictor of early reading achievement, there is now evidence from large-scale training studies here and abroad that phonological awareness can be heightened in kindergarten and first grade children (as well as older learning disabled children) through direct instructional activities (Bali and Blachman 1991; Blachman et al. 1991; Bradley and Bryant 1983; Cunningham 1990; Fox and Routh 1984; Lundberg, Frost, and Peterson 1988; Treiman and Baron 1983; Williams 1980). This instruction (taking a variety of forms, as we shall see in this chapter) has been shown to have a positive effect on the acquisition of both reading and spelling. It appears that once children are taught to recognize that speech can be segmented and that these segmented units are represented by letters, the systematic relationships between letters and sounds are easier to grasp and utilize in both reading and

writing. To take full advantage of an alphabetic writing system, one must first understand the alphabetic principle. This necessitates learning about the segmental nature of speech and its relationship to print.

In contrast to this view regarding beginning reading, there are those who argue that the use of written language does not require a "high level of conscious awareness of the units . . ." (Goodman and Goodman 1979, p. 139). They suggest as a corollary—and, I might add, without any research to support their premise—that activities that require "breaking whole (natural) language into bite-size, abstract little pieces . . . words, syllables, and isolated sounds" (Goodman 1986, p. 7) make learning to read more difficult. The Goodmans believe that learning to read is as natural as learning to speak (Goodman 1986; Goodman and Goodman 1979). Indeed, it would be convenient if reading and writing were "biologically primary" (Liberman and Liberman 1990) in the same way that speech is biologically primary. Then, reading and writing, like speech, might require only exposure to language to trigger the underlying biological mechanism and get it started. Unfortunately, this is not the case. As noted recently, "although it is popular for authors to cite examples of children who have acquired reading on their own, . . . for the vast majority of children the initial stages of reading must be traversed with the aid of some type of guided instruction from a teacher" (Stanovich 1986, p. 396). We are beginning to realize that, for many children, direct instruction is required to help them understand how print maps to speech.

Teaching Phonological Awareness

Numerous researchers have suggested that phonological awareness activities should be incorporated into the kindergarten and first grade classroom, before children have had a chance to fail in reading and spelling (Adams 1990; Blachman 1989; Juel 1988). There is now a considerable body of research to provide direction for the practitioner who wants to heighten the phonological awareness of children before and during early reading instruction (see Blachman in press for a detailed description of these activities). Although there is no cookbook for the practitioner to follow, the following review of some of the large-scale phoneme awareness training studies reveals an array of activities that can be used by the classroom teacher or clinician. One of the important ways in which these studies differ is whether or not the phonological awareness instruction is combined with instruction linking the phonological segments to the letters of the alphabet. In the first two studies (Cunningham 1990; Lundberg, Frost, and Peterson 1988), activities to

enhance phonological awareness are provided without making the connection to letters. In the next group of studies (Bradley and Bryant 1983, 1985; Ball and Blachman 1988, 1991; Blachman et al. 1991), the connections between the phonological segments in words and the alphabet letters that represent those segments are made explicit during training.

Phonological Awareness Instruction Without Making Explicit the Connections Between Sound Segments and Letters. In one of the largest studies to date, Lundberg, Frost, and Peterson (1988) provided eight months of metalinguistic training to 235 nonreading children in kindergarten classrooms in Denmark. Even though these children were a year older than their counterparts in kindergarten classrooms in the United States, they were not likely to have had much in the way of "informal literacy socialization" (p. 266). By electing to provide a program of instruction that did not include making connections between the sound segments in words and the letters that represent those segments, Lundberg and his colleagues were able to evaluate the impact of training in phoneme awareness, uncontaminated by letter-sound knowledge and prior to formal reading instruction.

In each classroom, the entire group of 15 to 20 children participated in a program that began with listening games, and was followed by rhyming games and segmentation of sentences into words. During the second month of the intervention, children learned to segment multisyllabic words into syllables through a variety of clapping and rhythmic activities. In the third month, phonemes were introduced. Children were first taught to identify initial phonemes, and in the fifth month they learned to segment two-phoneme words and then moved on to more complex items. The program emphasized games, but the authors stress that careful attention was paid to the sequencing, duration, and frequency of the activities. In a previous study, Olofsson and Lundberg (1983) had found that when the structure was varied across treatment conditions, only the most structured group showed improvement from pretest to posttest. The most structured group had participated in lessons three to four times per week for 15 to 30 minutes per lesson, while in the least structured group the teachers introduced the phoneme awareness activities more spontaneously during the normal play activities of the day.

In the more recent Lundberg study (Lundberg et al. 1988), the children who participated in the metalinguistic training demonstrated significantly greater metaphonological awareness than the control children. Although there were no differences between the two groups on

measures of prereading after the kindergarten intervention, when the children were tested a year later at the end of first grade, the treatment children significantly outperformed the control children in spelling. At the end of second grade, the treatment children outperformed the control children in both reading and spelling. Thus, Lundberg and his colleagues were able to demonstrate that phonological awareness can be heightened in children who have not yet learned to read, and when formal literacy instruction begins in first grade, this heightened awareness appears to have a facilitating effect on the acquisition of reading and spelling skills.

In a more recent study, Cunningham (1990) also investigated the impact of a phoneme awareness training program that did not include instruction in the connections between sound segments and letters. (It should be noted, however, that although the connections between letters and sounds were not introduced during the treatment activities, the first grade children in this study were involved in formal reading instruction in their classrooms during this 10-week period. We are not told whether letter name and letter sound instruction was taking place in the kindergarten classrooms during this 10-week period.) Kindergarten and first grade children participated in 10 weeks of instruction, meeting twice a week, in groups of four or five for 15 to 20 minute lessons. In a program adapted from *The ABD's of Reading* (Williams 1979), children learned to represent the sounds in words by moving wooden chips. Both segmenting and blending activities were included in the program. At the end of the intervention, the trained kindergarten and first grade children significantly outperformed the control children on measures of phoneme awareness and on a general measure of reading ability.

These studies clearly demonstrate the facilitating effect on beginning reading development of training in phonological awareness, even when the connections between the sound segments and letters are not made explicit during the intervention. By not including instruction in the connections between sounds and letters, these researchers were able to isolate and evaluate the effect of training in phonological awareness. It should also be noted, however, that in the study by Lundberg et al. (1988), the effect of the phonological awareness training on literacy was not evident until the children had been exposed to formal reading and spelling instruction a year later in first grade. It appears that once letter-sound relationships were introduced in first grade, the phonological awareness training the children had had in kindergarten gave them an edge over the control children that was apparent in their superior reading and spelling scores at the end of grade two. By dem-

onstrating that phonological awareness can be heightened outside the context of reading instruction, and that this awareness has an impact on the acquisition of reading and spelling once formal instruction begins. Lundberg and his colleagues have added support to a causal link between phonological awareness and reading acquisition—an important theoretical contribution. However, it does not necessarily follow that instruction in phonological awareness is *best* when provided outside the context of formal reading instruction, or that one should isolate these phonological awareness activities from activities that help children make connections between sound segments and letters. The next group of studies demonstrates the value of phonological awareness instruction that also incorporates letter-sound training.

Phonological Awareness Instruction that Makes Explicit the Connections Between Sound Segments and Letters. In a ground-breaking longitudinal and experimental training study in England, Bradley and Bryant (1983, 1985) not only established a causal relationship between phonological awareness and reading and spelling acquisition, but they also demonstrated the value of creating a link between the segmented sound units and and their corresponding printed symbols. In their longitudinal study, Bradley and Bryant found a significant relationship between the performance of 368 four- and five-year-olds on a sound categorization task and the reading and spelling of these same children three years later. An experimental training study was also conducted with 65 of these children who had low pretest scores on the sound categorization pretest. These children were randomly assigned to one of four groups matched on age, sex, IQ, and sound categorization ability. Children in the first group participated in 40, individually administered lessons spread over two years, during which they learned to categorize or group pictures on the basis of shared sounds. For example, the children were taught that *hen* could be grouped with *men* and *pen* because they rhymed, and also that *hen* could be grouped with *hat* and *hill* because they shared an initial sound. The children later worked on recognizing shared middle and final sounds. A mainstay of the program was a game called "the odd one out." Pictures of objects that rhymed or shared an initial, middle, or final sound were placed on the table, along with one picture that did not belong. The children were asked to identify the "odd one out" and to explain their choice. Children in the second experimental group also received the identical instruction in sound categorization that was provided to the first group, but this group also learned to represent the common sounds with plastic letters. For example, using the words *pen* and *hen*, the letters com-

mon to both words stayed on the table, while the children changed the *p* to an *h*. In the third group, established to control for the "special attention" provided to the children in the first two groups, the children also participated in 40 individually administered lessons spread over two years and practiced categorizing the same pictures used by the treatment groups. However, the children in this group were taught to categorize the pictures on the basis of semantic categories (e.g., *hen* and *dog* were grouped together because both are animals). The fourth group received no intervention.

The research of Bradley and Bryant has both theoretical and practical significance. Their results indicated that, although the children trained in sound categorization outperformed the children who did not receive this training, the most successful children were those who were trained in sound categorization and who also learned to represent the common sounds with plastic letters. These children had significantly higher reading and spelling scores than the children in the two control groups, and they also had significantly higher spelling scores than the children in the sound categorization only group. Recalling that the training consisted of only 40, 10-minute lessons spread over two years, it is even more impressive that in a follow-up study (Bradley 1988), conducted four years after the original study ended, children who learned to make the connections between sound categories and letter strings maintained their superior position in reading and spelling.

Although the Bradley and Bryant study answered some important questions by exploring the incremental benefit of connecting the sound segments to letters during the phoneme awareness instruction, their study also raised a new question. Because these researchers did not include a group that received only letter training, it was not possible to determine whether the *combination* of sound categorization plus letter training made the difference in reading and spelling achievement, or whether the letter training component itself was responsible for the superior performance on reading and spelling measures.

To answer this question, and also to explore the feasibility of working with groups of kindergarten children (rather than providing one-to-one instruction as in the Bradley and Bryant study), we (Ball and Blachman 1988, 1991) embarked on a phonological awareness training study in three, inner-city schools in a large urban district in upstate New York. Ninety kindergarten children were randomly assigned to one of three groups. The first group of children received instruction in phoneme segmentation and also in letter names and sounds. The second group of children (control group I) received instruction in a variety of language activities (such as having stories read to them and general

vocabulary development) and also received instruction in letter names and sounds using the same letter stimuli that were used by our treatment group. The third group was a no intervention control group. The children in the phoneme segmentation group and the language activities control group met in groups of four or five, four times a week for seven weeks, for 15 to 20 minute lessons. The lessons were taught outside the regular classroom by specially trained teachers.

The children in the phoneme awareness group followed a scripted, three-part lesson plan. At the beginning of each lesson, the children engaged in an activity called *say-it-and-move-it* (adapted from Elkonin 1963, 1973). Using a variety of manipulatives, such as disks, tiles, or blocks, the children learned to move the appropriate number of disks to represent the number of sounds in a one-, two-, or three-phoneme word. Initially, children represented one sound with one disk. The teacher would say, "Show me /i/" (or, for example, /a/ or /s/). The children would repeat the sound slowly, and as they were repeating it they would use one finger to move one disk from the top half of an 8½" by 11" sheet to the left end of an arrow (drawn from left to right) on the bottom half of the page. When the children were successful at representing one sound with one disk, the teacher moved on to one sound repeated twice, such as /i/ /i/. Again, the children repeated the sounds and represented each sound with a disk. Next, two phoneme words (e.g., *it, up*) were introduced and segmented following the same procedure. After modeling by the teacher, the child repeated the word slowly, moving a disk to represent each sound. After success with two-phoneme items, three-phoneme items were introduced, being careful initially to select words that begin with continuous sound letters (letters that can be held with a minimum of distortion) (e.g., *sun, lip, fan*). After the third week of say-it-and-move-it activities, a limited number of letters that had previously been mastered by the children were added to the blank tiles. Each item to be segmented during that lesson contained only one of the letter tiles. Children now had the option of segmenting each word using all blank tiles, or using a combination of one letter tile and blank tiles to represent the sound segments in the word.

The second activity each day was selected from a variety of *segmentation-related activities*. For example, the teacher might select a sound categorization game adapted from Bradley and Bryant (1983, 1985). Using pictures of words that rhymed or that shared initial, final, or medial sounds, the teacher would display three pictures with shared sounds and one picture that did not belong. The children would select the one that did not belong and explain their choice. An

alternative activity was what Elkonin, a Russian psychologist, called "sound analysis" (1963, 1973). The children were given a picture of a word to be segmented (e.g., *leg*) and were taught to move disks into boxes at the bottom of the page as the word was pronounced slowly. The number of boxes corresponded to the number of sound segments in the word. In another segmentation-related task, children learned to hold up a finger for each sound in a spoken word. The children also had an opportunity to practice blending activities by correcting "mistakes" made by a puppet who told stories and sometimes mispronounced key words by segmenting them.

The third activity in each lesson emphasized *letter names and sounds*. The nine letters that were introduced during the seven week training (*a, m, t, i, s, r, u, b, f*) were selected because they generate a substantial number of real words. These letters, as well as illustrations of key words and phrases, were presented on 8½" by 11" cards. For example, the *r* card depicted a red rooster in red running shoes. A variety of games that emphasized these sound-symbol associations were introduced, and the children played one game each day (e.g., a Bingo game was used that required the child to match the letter on the game board to a spoken sound or the initial sound of a pictured object).

As indicated earlier, the children in the language activities control group spent the same amount of time in their small groups as the phoneme awareness children. However, in the language activities group, the children worked on more general language activities, such as vocabulary development and listening to stories. In addition, the children in this group completed *letter name and letter sound* activities that were identical to those just described for the phoneme awareness children.

Prior to the intervention, the three groups of children did not differ on age, sex, race, SES level, phoneme segmentation, letter name knowledge, letter sound knowledge, or reading ability as measured by scores on the Word Identification Subtest of the Woodcock Reading Mastery Tests. After the intervention, the phoneme awareness group outperformed both control groups on phoneme segmentation, on reading (as measured by the word identification subtest of the Woodcock and a list of 21 phonetically regular words developed for this study), and on a developmental spelling test created for this study. It is important to note that, after the intervention, both the phoneme awareness group and the language activities group did not differ from each other on letter sound knowledge (both groups had received identical instruction in letter sounds), and both groups significantly out-

performed the no intervention control group on letter sound knowledge. However, only the phoneme awareness group significantly outperformed the no intervention control group in phoneme segmentation, reading, and spelling. An increase in letter sound knowledge, by itself, did not appear to have an impact on phoneme segmentation, reading, or spelling. We conclude that it is the *combination* of phoneme awareness training and learning to connect the sound segments to letters that makes a difference.

Thus, we now had additional evidence to document the positive effect on reading and spelling of training groups of kindergarten children in phoneme awareness. However, in this study (Ball and Blachman 1988, 1991) and in several of the others reviewed (Bradley and Bryant 1983, 1985; Cunningham 1990), the children received their instruction outside the regular classroom from specially trained teachers who were brought to the schools by the researchers. If we believe that instruction in phoneme awareness is an important ingredient in the kindergarten classroom, as many have suggested (see, for example, Adams 1990; Blachman 1989; Juel 1988), then we need to demonstrate the effectiveness of these activities when they are provided by regular kindergarten teachers to small groups of children within their classrooms.

To investigate this model of instruction, I received a three-year grant from the National Center for Learning Disabilities (formerly the Foundation for Children with Learning Disabilities) and embarked on a project to train inner-city kindergarten teachers and teaching assistants to provide this instruction in their classrooms (Blachman et al. 1991). Eighty-four treatment children (drawn from all 10 of the kindergarten classrooms in two low-income, inner-city schools in upstate New York) and 75 control children (drawn from all 8 of the kindergarten classrooms in two demographically comparable schools) participated in the study. The kindergarten teachers and teaching assistants participated in a series of seven, two-hour inservice workshops to learn how to provide the phoneme awareness program. During the workshops, they had opportunities to practice activities to use in their classrooms and to share questions and concerns about the program and the needs of individual children.

The treatment children met in small groups of four or five in their regular classrooms, with either their kindergarten teacher or teaching assistant providing the intervention (adapted from Ball and Blachman 1988, 1991). Each small group met for 15 to 20 minutes a day, four days a week for 11 weeks, and each phoneme awareness lesson consisted of the three steps previously described: *say-it-and-move-it, a segmentation-*

related activity, and letter name and letter sound training. Because the intervention in this study was an expanded version of our earlier program (this intervention was eleven weeks instead of seven), we were able to extend the *say-it-and-move-it* activities by using more letter tiles during the last three weeks of the intervention. Whereas in the earlier study (Ball and Blachman 1988, 1991) children used, at most, one letter tile plus blank tiles to represent a three-phoneme word, some children in this study progressed to using letter tiles to represent each sound in a three-phoneme real word (e.g., *sat*). Children without mastery of letter sounds continued to use blank tiles throughout the intervention.

To have a better appreciation of the children involved in this study, it is important to remember that both groups (as stated earlier) were from comparable low-income, inner-city schools (86% of the treatment children and 83% of the control children received free or supported lunch). Prior to the intervention, the children in the two groups did not differ on age, sex, race, SES, phoneme segmentation, letter name knowledge, letter sound knowledge, or reading (as measured by the Word Identification Subtest of the Woodcock Reading Mastery Tests–Revised). In addition, both groups had extremely limited knowledge of the alphabet prior to the intervention, demonstrating knowledge on our pretest of an average of only two letter sounds. Yet, after the intervention, the treatment children significantly outperformed the control children on phoneme segmentation, letter name knowledge, letter sound knowledge, two of three reading measures, and a measure of invented spelling. Specifically, the treatment children were able to read more phonetically regular real words and nonwords (added to control for the small pool of real words some children were exposed to during the last few weeks of the intervention) and to represent more of the sounds in the five words dictated on our developmental spelling measure (lap, sick, pretty, train, and elephant). Thus, the treatment children were able to apply their skill in phoneme awareness, along with their awareness of how the sound segments connect to print, to beginning reading and writing activities. For example, when asked to spell the word *sick*, although none of the treatment or control children spelled it correctly, 32% of the treatment children represented all of the phonemes with conventional letters (e.g., *sik*, *sic*). None of the control children achieved this level of representation. The treatment children appeared to have at least a beginning understanding of how print maps to speech—an understanding that had yet to be achieved by the control children. Perhaps most important is the fact that the treatment children were taught in their regular classrooms by their kindergarten

teachers and teaching assistants, as part of an otherwise typical kindergarten curriculum, before any of the children had an opportunity to fail in reading and spelling.

After Phonological Awareness—Then What?

Once a level of phonological awareness has been achieved (as measured, for example, by the ability to segment one-, two-, and three-phoneme items), where do we go next? We chose to follow our kindergarten phoneme awareness program with a first grade reading program that would explicitly build on this awareness (Blachman et al. in preparation). After a review of the segmentation and blending activities introduced in kindergarten, our first graders followed a five-step, code-emphasis reading lesson that had been used successfully in other inner-city schools (Blachman 1987). This program was developed specifically to provide classroom teachers with an alternative to programs, such as a traditional basal program, which often ignore the alphabetic principle.

The treatment children met with their first grade teachers each day and participated in a five-part reading lesson.

1. First, teachers briefly reviewed sound-symbol associations with the children (spending only two or three minutes on this activity). It was during this part of the lesson that a new sound was introduced.
2. Next, the teacher emphasized phoneme analysis and blending skills using a technique suggested by Slingerland (1971) to help children synthesize sounds without resorting to letter-by-letter blending. Each child used a small pocket-chart, called a sound board, to manipulate letters. The teacher slowly pronounced a word, such as *sat*, emphasizing the medial vowel. The child repeated the word, listened for the vowel, and then selected the appropriate letter (the vowels were color-coded to facilitate recognition) from the top pocket and moved it to the lower tier of the chart. The teacher then repeated the entire word and asked the child to locate the letter that represented the initial sound and then locate the letter that represented the final sound. The child then read the entire word. The teacher might then ask the children to change *sat* to *sam*, *sam* to *sad*, and *sad* to *mad*. Once new vowels were introduced, the children might be asked to change *sat* to *sit* and later, when blends were introduced, change *sit* to *slip*. Although one child was called on initially, all children in the group could make the words at the same time on their sound boards.
3. Once children could construct a pool of phonetically regular words

on the sound board (e.g., closed syllable words, such as *tag* and *lap*), these words were put on flash cards to be practiced for automatic recognition. High-frequency sight words (e.g., *said*) were also introduced at this point in the lesson. Again, as with the review of sound-symbol associations (step 1 in this lesson plan), this step of the lesson was also meant to be a brief review (2 to 3 minutes) to help children get ready to read these words in context.

4. The next step in the lesson was story reading. This step was emphasized, both in terms of time spent reading each day and also opportunities to read. For example, if a teacher had time to do only part of the lesson on a given day, story reading was the recommended focus of that lesson. The children used phonetically controlled readers (*Primary Phonics* series from Educators Publishing Service), stories from basal readers (the workbooks were not used), and popular trade books.
5. Finally, each lesson ended with a written dictation activity using words that had been produced earlier on the sound board and also words and sentences from the phonetically controlled readers. Once the children could comfortably read closed syllable words (e.g., *jet, hat*), the other five syllable patterns were introduced one at a time (i.e., open syllables, such as *he* and *my*; final "e" syllables, such as *bike* and *plane*; vowel team syllables, such as *rain, coat,* and *moist*; vowel plus "r" syllables, such as *car* and *corn*; and consonant *le* syllables, such as *table* and *handle*). The control children used a traditional basal reading program that emphasized whole-word memorization and did not provide the same systematic instruction in breaking the code.

At the end of the first grade year, the treatment children, who had now completed both the kindergarten phoneme awareness program and a first grade reading program that emphasized the alphabetic code, significantly outperformed the control children on posttest measures of phoneme segmentation, letter names, letter sounds, three measures of reading, our developmental spelling test (expanded to ten words), and a standardized spelling measure. In addition, fewer children in the treatment group were retained at the end of first grade, and fewer treatment children were referred for Chapter I remedial reading classes. Children who completed the code-emphasis program (either at the end of first grade or during their second grade year) were then placed in the basal program used by the school district. Thus, once the code-emphasis program was completed, our original treatment children began to receive the same reading instruction as the control children. We are continuing to monitor the reading achievement of the

children who were in our original treatment and control groups. Our preliminary results from testing, conducted at the end of the second grade year, indicate that the significant reading superiority of the treatment children has been maintained. For the children involved in our study (a population of low-income children from inner-city schools, who had limited knowledge about the alphabet prior to their kindergarten participation in this study), an early emphasis on phonological awareness, followed by a code-emphasis approach to reading in first grade, has resulted in reading achievement that is significantly greater than that of the children who did not participate in this program.

PROVIDING FOR INDIVIDUAL DIFFERENCES IN PHONOLOGICAL AWARENESS

There are, of course, many options for the type of reading program that follows an early emphasis on phonological awareness, and more of the options need to be carefully evaluated. What would appear to be crucial, however, is that "teachers understand the need to provide for individual differences in the phonological abilities that are required for reading in an alphabetic system" (Liberman and Shankweiler 1991, p. 14). This means, for one thing, making sure that all children learn about the segmental nature of speech and how print maps to speech. Although many children will make these discoveries on their own, by playing oral language games, such as rhyming (Maclean, Bryant, and Bradley 1987; Bryant et al. 1989), by repeated opportunities to connect printed and spoken words when being read to, and by opportunities to write, many other children will not be so fortunate. Some children will not have the necessary preschool exposure to language play and early literacy experiences that trigger these associations. Still other children, because of differences or deficiencies in phonological ability (many of whom may be labeled learning or reading disabled), will not discover the connections between print and speech on their own, *even* if they have the important preschool literacy experiences and opportunities to play with oral language. We have a responsibility to teach both groups of children, as well as those who are fortunate enough to learn to read regardless of the method.

An early emphasis on phonological awareness, using some of the activities described in this chapter, appears to put children in a better position to take advantage of reading and spelling instruction. Children who understand the segmental nature of speech, and who understand how the phonological segments are represented by the letters

of an alphabetic writing system, have been shown repeatedly to be more successful in reading and spelling acquisition than children who lack this awareness. As Juel (1988) found when she followed the reading development of 54 children from first to fourth grade, the poorest readers at the end of fourth grade were the ones who began first grade with little phonemic awareness. As a result, they did not develop good decoding skills in first grade. Without good word recognition skills, Juel found that these children were the ones who disliked reading and did less of it, losing valuable opportunities for vocabulary growth and for exposure to new concepts and ideas. This vicious cycle (described eloquently by Stanovich 1986) is what we would like to try to prevent, by making sure that all children develop the phonological awareness that will enable them to understand how print maps to speech.

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